

Mathematics Standards Overview

The organization of the NC Mathematics standards provides an opportunity for algebra skills to be used every year by continuing the integrated courses from K-8 through the first 3 math courses in high school. This integrated organization of standards provides for advanced work in mathematics without isolating students' ability to think more deeply about mathematics and how it relates to the world around them. The *Standards for Mathematical Practice* (SMP) continue to be included as the foundation for reasoning mathematically in all grades. Their inclusion in each grade and course emphasizes the importance of providing opportunities throughout ALL content standards for students to analyze, argue, model, and problem solve in meaningful ways.

Modeling with mathematics also remains an integral part of all grades, including the high school courses, in all content domains. While modeling with mathematics is the fourth SMP, we use the definition from The Consortium for Mathematics and its Applications (COMAP) and the Society for Industrial and Applied Mathematics (SIAM) to detail more specifically the process of mathematical modeling that the Standards for Mathematical Practice bring to the content standards:

Mathematical modeling is a process that uses mathematics to represent, analyze, make predictions or otherwise provide insight into real-world phenomena.

(Guidelines for Assessment and Instruction in Mathematical Modeling Education (GAIMME), 2015)

Mathematical modeling is the way students connect the mathematical content they are learning to the real world in which they live. The vision for mathematics education in North Carolina is to ensure North Carolina students have mathematical understanding at or above the level of their national and international peers, ensuring that they are life, college and career ready.

Elementary School Mathematics

Students in **Kindergarten** develop an understanding between numbers and quantities, and count to answer "How many?" They begin to develop an understanding of single-digit addition and subtraction based on subitizing. Students develop meanings for addition and subtraction as they encounter problem situations in Kindergarten, and they extend these meanings as they encounter increasingly difficult problem situations subsequent grades. In **grades 3-5**, students focus on understanding the meaning and properties of multiplication and division, and they extend these meanings as they encounter increasingly difficult problem situations. Developing an understanding of the properties of place value and the base ten number system is fundamental in elementary school. Students begin to develop an understanding of addition and subtraction using place value properties. As students progress they begin to use place value understanding to develop fluency with procedures and to solve problems by selecting and applying appropriate methods. Students also begin building a foundational understanding of fractions by partitioning circles and rectangles into equal shares which builds to an understanding of fractions as numbers. They develop an understanding of equivalence and begin to apply this understanding to compare quantities. Using models, student develop an understanding of the algorithms for adding, subtracting and multiplying fractions. Students learn to describe and compare measureable attributes, as well as, estimating and measuring in length units and comparing lengths. Students start to solve real-world problems using customary and metric units of measurement finding the

areas, perimeter and volume of geometric shapes. In elementary school, students work with categorical and numerical data, answering simple questions regarding the data in graphs. Students pose questions, collect and analyze data, generate appropriate mathematical representations, and interpret the data to answer questions. In geometry, students begin to identify and compose shapes. They develop an understanding of measurable attributes to describes shapes. Students understand that geometric figures can be described, analyzed, compared, and classified based on their properties, such as the presence or absence of parallel or perpendicular sides, angle measures, and symmetry. Students also begin to graph points in the first quadrant of a coordinate plane, and identify and interpret the x- and y-coordinates to solve problems. The concepts that students engage in during elementary school are fundamental to the work they will do in subsequent grades.

Middle School Mathematics

In middle school mathematics, students continue to build upon numerical concepts and skills learned in elementary grades. The development of fluency skills with numerical expressions and eventually simple algebraic expressions is a vital part of the middle grades standards. The development of formalized algebraic skills begins in **6th grade** with the application of numerical concepts to algebraic expressions and reasoning with one-variable equations. Statistical Thinking through the study of statistics and probability will also begin in 6th grade and continue into all the High School Courses. Lastly, one vital area of emphasis in 6th grade is the introduction of ratios and the relationship between equivalent ratios. Work with ratios will continue into **7th grade** and be explored in depth to build understanding for the concepts associated with proportional reasoning, a major connection to the study of functions. **8th grade** serves as the final year of pre-algebraic exploration. Students study the characteristics of linear and non-linear functions as they begin to see how patterns of data, in some cases, can be modeled with a linear relationship. The integration of concepts from statistics & probability and geometry continue into the high school courses.

High School Mathematics

The goal of NC High School Mathematics is for students to develop a thorough understanding of the characteristics and behaviors of specific families of functions. There is a great deal of emphasis on the application and understanding of functions in the high school mathematics standards.

NC Math 1 includes the study of linear, exponential and quadratic functions; extending from the work in middle school where proportional reasoning skills were emphasized along with an introduction of the concept of a function. NC Math 1 students apply and extend their understandings of functions from grade 8 to the formal definition of a function and the use of function notation when expressing functions symbolically. The Algebra, Geometry and Statistics & Probability standards also support the study of functions in NC Math 1.

In **NC Math 2**, quadratic, square root and inverse variation function families are added to the study of functions along with the more complex algebra skills to support working with more advanced algebraic expressions. NC Math 2 is also where students begin to apply transformational geometry learned in the middle grades to the study of functions. Geometric reasoning and proof are also emphasized in NC Math 2 as students focus on the study of triangles and their relationship to other planar figures.

In **NC Math 3** capstones the required standard mathematics progression with the study of more complex function families and geometric modeling as an application of concepts learned in previous years from number sense, algebra, functions and geometry.

Finally, on August 8, 2019, the State Board of Education unanimously approved the proposed mathematics content standards for 4th Level Mathematics Courses- Discrete Mathematics for Computer Science, NC Math 4 and Precalculus. These courses are designed to prepare students for any entry level post-secondary mathematics course. They are equal in rigor and designed to meet different student pathways into post-secondary education.

The purpose of **Discrete Mathematics for Computer Science** is to introduce discrete structures that are the backbone of computer science. Discrete mathematics is the study of mathematical structures that are countable or otherwise distinct and separable. The mathematics of modern computer science is built almost entirely on discrete mathematics, such as logic, combinatorics, proof, and graph theory.

The primary focus of **NC Math 4** is on functions and statistical thinking, continuing the study of algebra, functions, trigonometry and statistical concepts previously experienced in NC Math 1-3. The course is designed to be a capstone to introductory statistical concepts. Additionally, the course intentionally integrates concepts from algebra and functions to demonstrate the close relationship between algebraic reasoning as applied to the characteristics and behaviors of more complex functions.

The purpose of **Precalculus** is to build upon the study of algebra, functions, and trigonometry experienced in previous high school mathematics courses. This course will build on students' algebraic skills and understanding of functions to delve into real world phenomena and to deepen understanding of the functions in the course.

Instructional Materials Review Criteria Sheet - Mathematics Grades 9-12

INSTRUCTIONAL MATERIALS TITLE _____ BID NO. _____

PUBLISHER _____ COPYRIGHT DATE _____

AUTHOR(S) _____ ISBN _____

ADVISOR _____

TEXTBOOK COMMISSION MEMBER _____ MEMBER'S SBE DISTRICT _____

Indicate Appropriate Course:

__ NC Math 1

__ NC Math 2

__ NC Math 3

__ Discrete Mathematics for
Computer Science

__ NC Math 4

__ Precalculus

PART I CONTENT

Compatibility with the North Carolina Curriculum for Mathematics in the North Carolina Standard Course of Study (NCSCOS). *In accordance to State Board Policy TEXT-001, all items in Part I must be marked "yes" in order for the submission to be recommended.*

Answer yes to indicate the materials meet the criteria or no to indicate the materials do not meet the criteria. Please explain your responses. Be sure to cite specific page numbers, textual references as well as specific standards.

	<i>Yes</i>	<i>No</i>
A. Materials present the main concepts that support a minimum of 80% of the instructional objectives for the course/grade/media in the NCSCOS.		
B. Content, methodology, instructional levels, and teaching strategies are consistent with the curriculum's philosophy, values, and goals.		
Documentation for PART I CONTENT		

PART II PEDAGOGY

If three (3) criteria are answered no in Part II, do not complete parts III and IV.

	<i>Yes</i>	<i>No</i>
A. There is an appropriate balance of skill development, conceptual understanding, and mathematical practices.		
B. Mathematical concepts are connected and interwoven across strands instead of studied in isolation.		
C. Mathematical concepts are presented in depth and with increasing sophistication across grades.		
D. Materials have contextual problems that engage students and give rise to further exploration of mathematical concepts and include strategies and activities that are engaging and provide real world, relevant connections.		
E. Instructional materials help teachers create a classroom that encourages high expectations for all		

	students, enables all students to experience success, provides all students the opportunity for meaningful participation, and provides students with opportunities to manage their own learning.		
F.	Instructional materials emphasize the use of manipulatives to visualize concepts, acquire and analyze information, communicate solutions and provide a balanced approach to assessment (formative and summative).		
G.	Instructional materials (including lessons and assessments) include activities for all three stages of hands-on learning (concrete, representational, and abstract).		
H.	Instructional materials emphasize the use of technology to visualize concepts, acquire and analyze information, communicate solutions and provide a balanced approach to assessment (formative and summative).		
I.	Lessons promote classroom discourse by explicitly requiring students to share their thinking or strategies and provide students with opportunities to manage their own learning.		
J.	Instructional materials encourage application of higher-order thinking skills; promote critical thinking, communication, collaboration, and/or creativity; provide real world, relevant connections.		
K.	Instructional materials (including assessments) promote student inquiry, reflection, critical thinking, and problem solving.		
L.	Instructional materials require students to use inductive and deductive reasoning through questioning, conjecturing, explaining, and justifying.		
M.	Instructional materials are age appropriate, provide opportunities for personalization based on mathematical abilities, interests, learning styles, and use of language.		
N.	Instructional materials provide a rich source of experiences (problems, exercises, tasks, and assessments) in a variety of contexts that integrate multiple thinking skills.		
O.	Information is provided regarding what students might already know about mathematical ideas including common misconceptions that instruction should address.		
P.	Multiple forms of assessment tools (including performance tasks, open-ended questions, etc.) are provided for assessing student understanding at all stages of learning.		
Q.	Instructional materials include various assessment formats in order to inform instructional decision-making (before, during, and after instruction).		
R.	Instructional materials provide useful diagrams, charts, data sets, and/or models to help students conceptualize mathematical ideas.		

Documentation for PART II PEDAGOGY

PART III ACCESSIBILITY

Please provide evidence of the following:

A. Accuracy		Yes	No
1.	Material is error-free, current, uses correct grammar, spelling, and sentence structure. (This includes text, maps, charts, timelines, demographics, statistics, photos, etc.) Material does not contain outdated material.		
2.	Material is presented factually and objectively, representing a diverse balance of cultural, ethnic, racial, gender, and handicapped groups. (This includes text, photos, graphics, etc.)		

B. Appropriateness		Yes	No
1.	Content provides for grade appropriate, yet varied cognitive levels, abilities, and learning styles.		
2.	Instructional materials include strategies and activities that are engaging and that activate or supply prior knowledge.		
3.	Materials provide for a variety of exercises, reviews, assessments, performance tasks, etc., which provide opportunities for students to collect, organize, interpret, and evaluate information critically and creatively in a variety of formats.		
4.	Format is visually appealing and not distracting from content; Features or text/layout are level appropriate and enhance learning.		

C. Scope		Yes	No
1.	Material presents information in sufficient depth and breadth to cover adequately course content in a logical manner to address grade level expectations.		
2.	Material includes necessary guides such as a table of contents, glossary (English & Spanish), index, sidebars, atlas, dictionary/thesaurus, bibliography/footnotes, <i>see</i> and <i>see also</i> references, web sites, literature links, support agencies etc.		
3.	Key concepts, skills, vocabulary are identified, developed, reviews, and reinforced.		

D. Teacher Resources		Yes	No
1.	Instructional materials include teacher resources, which provide information and opportunities for teachers to increase their own understanding of the subject specific concepts and structures for teachers to navigate and search for resources easily.		
2.	Adequate teacher resources, which include suggestions for intervention, scaffolding, acceleration, extension of learning, integration, feedback, and review.		
3.	Materials should include summary of material contents, provide instruction and/or behavioral objectives (observable outcomes that students will demonstrate at the end of a lesson), supplemental or background information and answer keys/rubrics.		
4.	User navigation of resources is easy to learn; Content structure is logical, well organized, comprehensive, durable and reasonably sized, with sufficient material for student use.		
5.	Resources should accommodate the needs of both a first-year teacher and the veteran teacher.		

E. Technology		Yes	No
1.	Technology should meet all criteria for accuracy, appropriateness, and scope. Format is easy to navigate, visually appealing and not distracting from content. Teacher materials should also meet the criteria of the teacher resources. If student access is allowed, a Save/Record feature should be included. Print resources are available or may be converted to specialized formats for accessibility.		
2.	Digital content can be assessed on various devices and Internet browsers. Digital resources are accessible.		
3.	Technology features include accessibility options to enable all users equivalent access.		
4.	The technology resource design contains motivational elements to engage students, appropriate visual and auditory elements, and provides an intuitive user interface.		
5.	There are robust digital resources for student learning, practice and assessment.		
6.	Digital materials provide opportunities for meaningful, interactive experiences.		
7.	Digital materials provide content supports for teachers to further develop expertise.		

Documentation for PART III ACCESSIBILITY

PART IV Overall Analysis: (For Textbook Commission Use Only)

These instructional materials meet the criteria ____ yes ____ no.

Documentation for PART IV: Comments that further describe standards for yes or no responses in Parts I, II, or III.

MATHEMATICS : EC EVALUATION

SUBJECT _____ GRADE _____

TEXTBOOK MATERIALS TITLE _____ BID NO. _____

PUBLISHER _____ COPYRIGHT DATE _____

AUTHOR(S) _____ ISBN _____

ADVISOR _____ TEXTBOOK COMMISSION MEMBER _____ MEMBER'S SBE DISTRICT _____

Answer “yes” to indicate the textbook materials meet the criteria or answer “no” to indicate the textbook materials do not meet the criteria.

Appropriateness, Scope, and Resources	Yes	No
1. Content provides for grade appropriate, yet varied cognitive levels, abilities, and learning styles.		
2. Content is relevant, links to and builds on student prior knowledge, contains multisensory strategies, and promotes active student engagement.		
3. Materials provide for a variety of exercises, reviews, assessments, and performance tasks, which provide opportunities for students to collect, organize, interpret, and evaluate information critically and creatively in a variety of formats, and that promote opportunities for two-way and in-depth student discourse about math (not just procedures).		
4. Text and layout are level appropriate, including font, color, spacing legibility, photos, graphics, and captioning.		
5. Supplemental resources include necessary guides such as table of contents, glossary (English & Spanish), index, sidebars, atlas, dictionary/thesaurus, bibliography/footnotes, <i>see</i> and <i>see also</i> references, web sites, literature links, and support agencies etc.		
6. Key concepts, skills, vocabulary are identified, developed, reviewed, and reinforced.		
7. Materials provide adequate teacher resources, which include suggestions for remediation, acceleration, extension of learning, integration, feedback, review, and include examples that foster in-depth understanding of math that are clearly evident throughout.		
8. Materials include a summary of contents, instruction and/or behavioral objectives, supplemental or background information, and answer keys/rubrics.		
9. Materials are well organized, easy to use, comprehensive, durable and reasonably sized, and contain sufficient material for student use.		
10. Resources accommodate the needs of beginning through veteran teachers.		
11. Technology meets criteria for accuracy, appropriateness, and scope. It is easy to navigate, visually appealing, and includes a Save/Record feature; if applicable.		

Keeping in mind the needs of EC students and their teachers, please give specifics to support both the yes and no responses.

Documentation for yes and no responses:

MATHEMATICS: EL EVALUATION

SUBJECT _____ GRADE _____

TEXTBOOK MATERIALS TITLE _____ BID NO. _____

PUBLISHER _____ COPYRIGHT DATE _____

AUTHOR(S) _____ ISBN _____

ADVISOR _____ TEXTBOOK COMMISSION MEMBER _____ MEMBER'S SBE DISTRICT _____

*Answer **yes** to indicate the textbook materials meet the criteria or **no** to indicate the textbook materials do not meet the criteria.*

Appropriateness, Scope, and Resources	Yes	No
1. Content provides grade-appropriate, yet varied linguistic levels, abilities, and learning styles.		
2. Content is relevant, addresses a variety of cultural aspects, links to prior knowledge, builds background knowledge, and promotes active student engagement.		
3. Materials provide opportunities for scaffolding interaction, such as, a variety of exercises, reviews, assessments, and performance tasks (e.g., including sentence frames, word banks, etc.).		
4. Materials provide opportunities for students to collect, organize, interpret, and evaluate information critically and creatively in a variety of formats (e.g., including the use of the student's first language).		
5. Text and layout are age/proficiency/grade-level appropriate, including font, color, spacing legibility, photos, graphics, and captioning.		
6. Material includes necessary guides such as a table of contents, glossary (e.g., English & Spanish), index, sidebars, atlas, dictionary/thesaurus, bibliography/footnotes, <i>see</i> and <i>see also</i> references, websites, literature links, and support agencies, etc.		
7. Key concepts, skills, and vocabulary are identified, developed, reviewed, and reinforced.		
8. Materials provide adequate teacher resources, which include suggestions for acceleration, extension of learning, integration, feedback, and/or review specific to English Learners.		
9. Materials include a summary of contents, instruction and/or behavioral objectives, supplemental or linguistically and culturally relevant background information, and answer keys/rubrics.		
10. Materials are well organized, easy to use, comprehensive, durable and reasonably sized.		
11. Resources accommodate the EL Support needs of beginning through veteran teachers.		
12. Technology is easy to navigate, visually appealing, and ideally includes a screen reader, dictionary, and a Save/Record feature, if applicable.		

Keeping in mind the linguistic needs of EL students and their teachers, please give specifics to support both the yes and no responses.

Documentation for yes and no responses: